

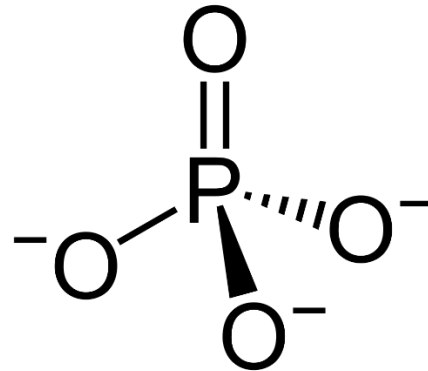
Alkaline Phosphatase

Alkaline Phosphatase is an indicator of successful pasteurization of milk products and can also act as an indicator of microbial contamination.

Alkaline Phosphatase (ALP) is an enzyme natural to milk. An enzyme is a type of protein that acts as catalyst to biochemical reactions. Each enzyme catalyzes a specific reaction. Alkaline phosphatase removes phosphate groups from organic compounds. In the 1930s, research concluded that alkaline phosphatase (ALP) was inactivated at a slightly higher temperature than what was required to inactivate *Mycobacterium tuberculosis*, one of the most heat stable pathogens that could be present in milk. This led to ALP testing becoming accepted as rapid validation for the pasteurization of milk products. Test results above regulated limits can indicate inadequate pasteurization or the reintroduction of raw milk.



Ribbon diagram of bacterial ALP



Phosphate group

Due to the widespread presence of ALP in living organisms, bacteria and other organisms will also contribute to the ALP present in milk products. Thermotolerant (able to survive pasteurization) and Thermophilic (able to grow at high temperature) organisms can accumulate in processing equipment after heat treatment. Several of these organisms are also capable of developing endospores and/or biofilm. A common location for this is the regen section of heat treatment equipment such as HTSTs or UHTs.

Common practice in most processing facilities is the measurement of ALP when regulatory seals have been broken. This is done to validate the system has not been tampered with and prove milk has been consistently pasteurized.

Troubleshooting High Levels of Alkaline Phosphatase:

- What is the sample location?
 - Post heat treat hold tubes
 - Post regen

Are You Aware...?

- Next step processing equipment (vat / silo)
- Consistent results or increasing over duration of production?
 - Indicator of raw milk introduction vs. organism accumulation/proliferation
- Other indicators or test results consistent?
 - Product pH change
 - Elevated micro testing
 - Increased ATP
- Have there been any recent equipment changes?
 - Heat treatment equipment expansion
 - New monitoring equipment
 - Filters
- Have any processing parameters changed?
 - Flow / production throughput
 - Silo temperature
 - Additional pre-heating steps

Reach out to the **RITE team** for more information on alkaline phosphatase.